



Reg. No. :

Name :

**Fifth Semester B.Tech. Degree Examination, November 2013
(2008 Scheme)**

**Branch : Information Technology
08.503 : THEORY OF COMPUTATION**

Time : 3 Hours

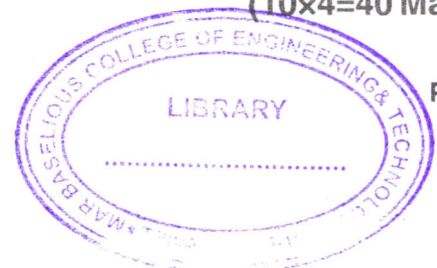
Max. Marks : 100

PART – A

Each question carries **4** marks.

1. Are DCFLs closed under complementation. Why ?
2. What are meant by useless symbols in a CFG ? How are they removed ?
3. Give the formal definition of regular expressions.
4. Is $L^R = \{x/x^R \text{ is in } L\}$ regular ? Why ? (Assume L is regular).
5. What is meant by Church-Turing thesis ?
6. Show that partial recursive functions computed by Turing Machines are analogous to recursively enumerable languages.
7. What are Moore and Mealy machines ?
8. How does Myhill-Nerode theorem help in minimizing DFA ?
9. $L_1 = \{a^n b^n/n > 0\}$ and $L_2 = \{a^n b^{2n}/n > 0\}$.
Is $L_1 \cup L_2$ a DCFL ? Why ?
10. What is a Universal Turing Machine ?

(10×4=40 Marks)



P.T.O.



PART – B

Each question carries 20 marks.

11. a) Show that for every regular expression r , there exist an NFA with ϵ -transitions which accept $L(r)$. 10
- b) Design a Moore machine which outputs $N \bmod 5$ where N is a binary number given as input. 10

OR

12. Show that there exist an algorithm to determine whether two DFAs accept the same language. Give proof for each step of the algorithm. 20

13. a) State and prove the pumping lemma for CFLs. 10

- b) Given $L_2 = \{a^n b^m a^n / m > 0, n > 0\}$

Is L_2 a CFL? If so, design a PDA which accepts L_2 otherwise, using pumping lemma, prove that L_2 is not a CFL. 10

OR

14. Show that for every CFL, there is an equivalent PDA. 20

15. Design a Turing machine which accepts $L = \{a^n b^n c^n / n > 0\}$. 20

OR

16. a) Show that the Universal Language is recursively enumerable. 12

- b) What is meant by decidable and undecidable problems? Explain. 8

(3×20=60 Marks)